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(54) A METHOD OF FORMING A MOULDING BY DUAL INJECTION AND A MOULDING FORMED IN ACCORDANCE WITH SUCH A METHOD

VERFAHREN ZUM HERSTELLEN EINES FORMLINGS DURCH DOPPELSPRITZGIESSEN UND EIN NACH DIESEM VERFAHREN HERGESTELLTER FORMLING

PROCEDE DE MOULAGE PAR DOUBLE INJECTION ET PIECE MOULEE OBTENUE SELON CE PROCEDE

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(56) References cited:
EP-A- 0 309 933
FR-A- 2 079 295
GB-A- 2 080 187

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Description

The invention relates to a method of forming a moulding by dual injection and a moulding formed in accordance with such a method. In particular, but not exclusively, the invention is concerned with the moulding of a vehicle body component in a way which will avoid having to apply a coating of paint to a pre-formed component.

Dual injection moulding is a technique involving injecting a first plastics material into a mould followed by a second plastics material. The injection steps causes the first material to coat the mould surfaces and the second material forms a substrate for the first. The component so formed may harden in the mould prior to removal from the mould.

An example of dual injection moulding is disclosed in GB-A-1,420,948. However any moulding produced by such a method will require subsequent painting outside the mould.

Another example of dual injection moulding is disclosed in GB-A-2 080 187 which describes a method of resin injection moulding (RIM) where a low viscosity liquid resin, for example liquid paint, is injected at low pressure (eg 7 bar) into a mould followed by a higher viscosity liquid resin. The low viscosity liquid resin forms a coating for the higher viscosity resin. Such low viscosity paints take the form of a liquid thermosetting resin having coloured pigments which is injected in its uncured liquid form and subsequently cured. A disadvantage of using a low viscosity liquid resin is that of controlling accurately the spread of the liquid paint to produce a coating of uniform thickness. Therefore such a process is suitable only for the production of primer coats which have to be finished by applying a coat of paint in a conventional manner outside the mould, eg by paint spraying.

An increasing number of motor vehicles are now provided with components such as body panels made from plastics materials. For example it has been proposed to form a vehicle body component by initially injecting an unfilled thermoplastics material followed by a glass filled polymer material as a substrate. The unfilled plastics material thereby forms a smooth coating on the substrate ready to receive paint which is subsequently applied by spraying or dipping the cured moulding in a paint facility. We are unaware of any vehicle component being made by such a process which does not subsequently require a finishing paint coating applied outside the mould and the motor industry continues to refine its painting facilities, which in themselves can involve large capital investment and ongoing maintenance sums, and present environmental difficulties.

One object of the present invention is to provide an improved method of forming a moulding by dual injection which will render unnecessary the subsequent painting of the moulding or moulded component.

According to one aspect of the invention there is provided a method of forming a painted moulding, comprising injecting a plastics coating material into a mould and injecting a plastics substrate material into the mould by dual injection to cause the coating material to coat a surface of the mould and to produce a moulding having a coating formed by the plastics coating material, characterised by providing the coating material as a powdered or granulated cross-linking plastics paint material and heating the powdered or granulated plastics paint material to a plastic condition for injection into the mould.

The powdered or granulated paint material heated to a plastic condition and applied in that way provides the required paint finish by an in-mould process which dispenses with the need to spray a coating of paint subsequently on to the moulding. Also it has been found that the use of powdered or granulated plastics paint enables a much more controllable flow to be obtained in the mould resulting in a paint coating thickness which is controllable. Thus it is possible with the method of the present invention to obtain a very uniform and consistent paint finish on the moulding. Where this moulding is in the form of, say, a vehicle body panel, such a uniform and consistent finish is most advantageous from a point of view of aesthetics and quality control aspects. Moreover the use of powdered or granulated plastics paint gives a surprisingly good finish uncharacteristic of the "orange peel" effect normally obtained by spray or dip coating a surface with powdered plastics paint.

It is frequently a requirement with vehicle body paintwork that a metallic finish be provided. Typically such a finish is provided by adding metallic or mineral flakes or platelets to the liquid paint sprayed or dip applied to the body component. Spray or dip powder plastic coating is not used to give a metallic finish to vehicle bodywork because the metallic or mineral additives do not orientate in the desired manner and an unsatisfactory finish results. That is due to the fact that the powder coating during melting to form the coating must retain a high viscosity impeding the movement of the additives. However by using a method in accordance with the invention, the injection process produces a flow of paint melt which, when containing such metallic or mineral additives, causes the additives to align or orientate to give the desired effect.

It is preferred particularly to use a powdered or granulated plastics paint of a thermosetting kind which has a thermoplastic phase. In such a case the powdered or granulated plastics paint can be heated sufficiently to bring it to a plastic condition (typically a putty-like condition) in its thermoplastic phase to enable it to be injected at high pressure into the mould (eg in excess of 1000 bar). For example heating a powdered or granulated plastics paint to a temperature in the range 80° to 260°C will normally bring it to a plastic condition for injection into the mould. With such a coating material, the heat absorbed to bring it to the plastic

phase may ideally be utilised to cause the material to begin thermosetting, e.g., as it coats the mould or after it has coated the mould following the introduction of the substrate material. In that way a reasonably rapid curing of the coating can be achieved once it has coated the mould. However, if desired, the coating can be cured or curing can be completed after removal of the moulding from the mould, i.e. post cured.

Post curing enables the curing temperature and time to be particularly carefully controlled preferably with a view to creating a strong bond between the two materials.

The paint and substrate materials are preferably selected so as to have an affinity one for the other.

The method may include effecting cross-linking between the moulded coating and substrate material during moulding or during curing of the materials.

According to a second aspect of the invention there is provided a moulding formed by a method according to the first aspect of the invention or any of the consistory clauses related thereto.

The invention also includes a moulding formed by dual injection comprising a plastics substrate material having a plastics coating material thereon, characterised in that the plastics coating material is formed from a powdered or granulated plastics paint material which has been heated to a plastic condition, injected into the mould and cross-linked to form a cured coating.

A method of forming a moulding by dual injection and a moulding in accordance with the invention will now be described by way of example with reference to the accompanying drawings in which:-

Fig.1 is a diagrammatic cross section through part of a dual injection moulding machine showing the injection into a mould of a granulated plastics paint material in a plastic condition,

Fig.2 shows the introduction of a substrate material into the mould,

Fig.3 shows the form of the moulding after injection of the substrate material is complete,

Fig.4 shows a second injection of the powdered plastics paint material in a plastic condition to finish off the moulding step,

Fig.5 is a diagrammatic view of the moulding removed from the mould and placed in an oven for post curing the coating,

Fig.6 is a cross section to a larger scale through part of a component made by a method in accordance with the present invention,

Fig.7 is a cross section to a larger scale showing this way in which a paint having metallic effect additives is moulded.

Fig. 8 is a perspective view of a vehicle wing in accordance with the present invention and including an encircled enlargement of a section of the wing and

Fig. 9 is a cross section of part of the wing of Fig. 6 on the line IX - IX in Fig. 8.

With reference to Fig. 1, the injection moulding machine has a mould 10 having first and second halves 12, 13 defining a hollow cavity 14 therebetween. The hollow cavity 14 communicates with a block 15 which defines a passageway 16 for material from a first extruder 17 and a second passageway 18 for material from a second extruder 19. A rotary valve 20 is positioned between the block 15 and an inlet port 22 in mould half 13 for selection of the material to be injected into the cavity 14.

The extruder 17 is associated with a heater 17a and is operated to deliver a coating material 23 formed by heating thermosetting granulated plastics paint material 23a into a thermoplastic phase in which it takes on a putty-like plastic condition. A suitable granulated plastics paint material has been found to be one which will have a plastic condition at a temperature of around 170° with a putty-like viscosity. One such thermosetting granulated paint material, is Interpon UT 1410 available from Courtaulds Coatings (Holdings) Ltd. of Felling Gateshead, Tyne and Wear, England which requires post curing after removal of the moulding from the mould cavity.

As shown in Fig.1, an initial quantity of the coating material 23 is injected into the cavity 14, the mould being at a temperature in a range of, for example, 20°C to 100 °C. The valve 20 is then rotated to shut off feed of material 23. As shown in Fig.2, a thermoplastics substrate material 24 such as ABS or nylon 24a is heated in a heater 19a associated with the second extruder 19 and is injected into the cavity 14 behind the injected material 23 as shown in Fig. 2. Injection of the material 24 causes the material 24 to spread the coating material 23 over the mould surfaces 14a defining cavity 14 and injection is continued until the surfaces are coated with the material 23 and the material 23 envelopes the material 24. The material 24 thus forms a thermoplastics substrate or core as shown in Fig.3 having a coating or skin formed by the material 23.

In Fig.4, the valve 20 is rotated again to shut off feed from the extruder 19 and to permit injection of coating material 23 into the port 22 so that the machine is ready for another injection cycle.

The heat applied to the thermosetting coating material 23 while it is temporarily in the extruder 17 is absorbed by the material and, once in the mould 10, the heat will begin the curing process of the material. That process may begin as the material is being spread over the mould surfaces by the incoming substrate material

or may begin after the injection steps are complete. Preferably, however, the curing of the thermosetting coating material 23 and substrate material 24 will allow sufficient time to enable cross-linking to take place between the two materials thereby ensuring an extremely good bond between them. Instead of a cross-linking occurring between the coating and substrate materials, a good bond alone may be achieved between them due to their intimate contact during injection.

If additional heat is required to cure the thermosetting coating material 23, the moulding (indicated at 11 in Fig.5) can be removed from the mould 10 and placed in an oven 30. The oven is pre-heated to a temperature of around, for example 250°C. The moulding 11 is subjected to heat at that temperature as indicated by arrows for a period which is sufficient to cure the coating material 23 but which is insufficient to have a significant softening effect on the bulk of the thermoplastics substrate material 24. It is believed that with careful control of timing and temperature, a good bond will be achieved between the coating material 23 and the substrate material 24.

The substrate material 24 is preferably selected so that it will have an affinity to the coating material 23 and materials such as ABS and nylon constitute suitable substrate materials for such a coating material 23.

The depth d (Fig.6) of the coating material 23 can be selected to be at least as thick as a paint coating which would normally be applied to, say, a car body component in a paint spraying or dipping facility. Also, the injection moulding tool 10 can provide a superfine surface finish for the coating which will compare well with that obtained by spray or dip painting. Moreover, by producing a coating in a dual injection moulding process, the finished coating will be free from contamination by air-borne dust as well as being uniform and consistent. Also, the method is cleaner and more environmentally friendly than producing a finish using a conventional paint facility as the process does not involve extracting contaminated air or effluent from a paint facility into the atmosphere.

If desired, the substrate material 24 can be a thermosetting material instead of a thermoplastics material. The injection steps will be the same as that described above with reference to the drawings except that the mould will be hotter eg at a temperature in a range 100°C to 180°C. As before, the heat absorbed by the granulated plastics paint 23a to bring it to a plastic condition will lead to the onset of curing and the hot mould will speed up curing of the coating formed by coating material 23. The heat from the mould may also at least partially cure the substrate material 24. If desired the moulding can be left to cure completely in the mould 10 or can be removed for post curing outside the mould, e.g., in the oven 30. In the latter case heat applied to the thermosetting substrate material 24 will not present any distortion problems to the thermosetting materials.

The substrate material 24 may be injected as a foamed thermoplastics/thermosetting material.

In the case where a metallic finish is required, reference is now made to Fig. 7. The granulated plastics paint coating material 23a has metallic or mineral flakes 40 added. The flakes 40 provide a metallic finish in the paint coating. It has been found that as the coating material 23 spreads over the surfaces 14a of mould cavity 14, the spreading or flowing action causes the flakes 40 to orientate themselves so that they lie generally in a plane parallel with the flow or spread direction indicated by arrow F and generally parallel with the plane of the coating formed by the coating material 23. Also the flakes 40 are constrained to lie within the confines defined by the surfaces 14a of cavity 14 so as not to project from the finished paint surfaces of the moulding.

It has hitherto not been possible to achieve a metallic finish using powdered plastics paint coatings. That is due to the fact that the required thickness and viscosity of normal spray/dip powder paint coatings is too great to allow the metallic or mica flakes to orientate in the desired manner. However the method in accordance with the invention produces surprisingly good results when a metallic finish is required in view of the fact that the relatively thin paint layer, together with the effect of flow on the flakes, provides the required orientation for an acceptable metallic finish.

It is envisaged that the method in accordance with the invention can be used to produce by injection moulding various body components of a motor vehicle having a paint finish provided by the coating material 23.

An example of a vehicle body wing in accordance with the invention is shown in Figures 8 and 9.

Utilising a mould normally used for the injection moulding of a vehicle front wing 50 for subsequent spray or dip painting after it has been removed from the mould, the mould was positioned on a machine for providing dual injection of plastics material. The two extruders of the machine were supplied with coating and substrate materials 23,24 respectively.

The coating material used was granulated paint heated to a temperature of 190°C. Such heating brought the coating material to its plastic phase enabling it to be injected by its extruder into the mould using an injection pressure of around 1300 bar. The granulated paint was mixed with an additive comprising metallic and mica flakes to provide a metallic finish to the wing 50.

The substrate material 24 was white polypropylene and was heated to a temperature of 230°C to enable it to be injected by the second extruder at a pressure of 1300 bar.

Using the injection method as described with reference to Figures 1 to 4 with the mould heated to a temperature of 60°C, the materials 23, 24 were injected into the mould and the moulded materials were left in situ in the mould for a period of around 90 seconds to allow the materials to cure. The moulded wing 50 was then

removed from the mould and inspected.

It was found that the coating material 23 had completely enveloped the substrate 24 leaving no light patches or uncovered areas.

The mould itself did not have mould cavity surfaces of a quality which would enable a high gloss finish to be obtained as wings normally made in the mould were intended for post mould painting by spraying or dipping. Nevertheless, the finish obtained with the moulded plastics paint material was extremely good giving a metallic paint appearance comparable with that normally acceptable on motor vehicle body panels. The moulding demonstrated clearly that a mould cavity having a superfine finish would enable high gloss body panels to be produced by a method in accordance with the invention with no sign whatsoever of the typical "orange - peel" finish characteristic of powder paint coatings.

The depth d of the paint coating material 23 on the polypropylene substrate material 24 could be controlled by varying the quantities of the materials 23, 24 injected into the mould and it was found that the two materials cross-linked well rendering the coating and substrate highly resistant to separation.

The wing 50 was moulded so as to include integral fixing flanges 52, 53 with fastener receiving apertures 52a, 53a therein and a stiffening flange 54. It was found that the paint coating material 23 enveloped the edges of the flanges and the apertures leaving no gaps where the white polypropylene was visible.

It was found that the same results were obtained on repeating the moulding process and with the vehicle front wing selected for the experiment (suitable for use on a Rover Maestro vehicle) it was found possible to provide wing mouldings by a method in accordance with this invention at a rate of one wing every 120 seconds.

The plastics paint material 23a used is of a kind which has hitherto been used in powder form for spray or dip coating of a surface. With spray or dip coating using powder paint, the powder coated surface is subsequently heated so that the powder melts whilst retaining a high viscosity, coalesces and forms a paint finish on the surface. The material is normally produced as a solid sheet of plastics paint which is then ground into a powder or into a granulated form, the latter being the preferred form for use in the method according to the present invention for flowability to the extruder 17 from its hopper 42 although a powdered form may be used.

Claims

1. A method of forming a painted moulding, comprising injecting a plastics coating material (23) into a mould (10) and injecting a plastics substrate material (24) into the mould by dual injection to cause the coating material to coat a surface of the mould and to produce a moulding (11) having a coating formed by the plastics coating material (23), characterised by providing the coating material (23) as a powdered or granulated cross-linking plastics paint material (23a) and heating the powdered or granulated plastics paint material to a plastic condition for injection into the mould.

2. A method according to Claim 1 characterised by providing the powdered or granulated plastics paint material (23a) as a thermosetting material having a thermoplastic phase and heating the thermosetting powdered or granulated plastics paint material to bring it to a plastic condition for injection into the mould.

3. A method according to Claim 2 characterised by heating the powdered plastics paint material (23a) to around 80° to 260°C to bring it to a plastic condition for injection into the mould (10).

4. A method according to Claim 2 or 3 characterised by allowing the heat absorbed by the powdered or granulated plastics paint material (23a) to bring it into a plastic condition for injection also to cause the plastics coating material (23) to begin thermosetting during the moulding process.

5. A method according to Claim 2 or 3 characterised by curing the coating (23) formed by the heated powdered or granulated plastics paint material (23a) after removing the moulding (11) from the mould (10).

6. A method according to any preceding Claim characterised by forming the substrate from a thermoplastics material.

7. A method according to Claim 6 when appendant to any of Claims 2 to 5 characterised by applying heat to the surface of the moulding (11) so as to cure the plastics coating material (23) without the applied heat (14a) having any substantial softening effect on the substrate.

8. A method according to any preceding Claim characterised by providing a said powdered or granulated plastics paint material (23a) as one which has some affinity to the substrate material.

9. A method according to any preceding Claim characterised by effecting cross-linking between the moulded plastics coating material (23) and substrate material (24) prior to or during curing of the materials.

10. A method according to any preceding claim characterised by providing flake-like additives (40) in the powdered or granulated plastics paint material (23a) and utilising spreading action of the plastics coating material formed therefrom in the mould (10)

to orientate the flakes (40) so that they lie generally parallel with the flow or spread direction (F).

11. A moulding formed by dual injection comprising a plastics substrate material (24) having a plastics coating material (23) thereon characterised in that the plastics coating material (23) comprises a moulded and cured coating formed from cross-linking powdered or granulated plastics paint material (23a).

12. A moulding according to Claim 11 characterised in that the powdered or granulated plastics paint material (23a) is a thermosetting material having a thermoplastic phase.

13. A moulding according to Claim 11 or 12 characterised in that the powdered or granulated plastics paint material (23a) is one which has some affinity for the substrate material.

14. A moulding according to Claim 11, 12 or 13 characterised in that the substrate material (24) is a thermoplastic material.

15. A moulding according to any of Claims 11 to 14 characterised in that the moulded plastics coating material (23) formed from the powdered or granulated plastics paint material (23a) is cross-linked with the substrate material (24).

16. A moulding according to any of Claims 11 to 15 characterised in that the moulded plastics coating material (23a) formed from the powdered or granulated plastics paint material (23a) includes flake-like additives (40).

17. A moulding according to Claim 16 characterised in that the flake-like additives (40) lie generally in a plane parallel with the plane of the plastics coating material (23) when moulded.

18. A moulding according to any of Claims 11 to 17 in the form of a vehicle body part.

Patentansprüche

1. Verfahren zum Herstellen eines lackierten Formlings, bei dem man ein Kunststoffbeschichtungsmaterial (23) und ein Kunststoffsubstratmaterial (24) durch Doppelspritzgießen in die Form spritzt, um zu bewirken, daß eine Fläche der Form mit dem Beschichtungsmaterial beschichtet wird, und einen Formling (11) mit einem Überzug aus dem Kunststoffbeschichtungsmaterial (23) herzustellen, dadurch gekennzeichnet, daß man das Beschichtungsmaterial (23) als vernetzendes Kunststofflackpulver oder -granulat (23a) bereitstellt und das Kunststofflackpulver oder -granulat bis zum Erreichen eines plastischen Zustands zum Einspritzen in die Form erwärmt.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß man das Kunststofflackpulver oder -granulat (23a) als wärmehärtbares Material mit einer thermoplastischen Phase bereitstellt und das wärmehartbare Kunststofflackpulver oder -granulat erwärmt, bis es einen plastischen Zustand zum Einspritzen in die Form (10) erreicht.

3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß man das Kunststofflackpulver (23a) auf ca. 80° bis 260°C erwärmt, um es zum Einspritzen in die Form (10) in einen plastischen Zustand zu bringen.

4. Verfahren nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß man gestattet, daß die von dem Kunststofflackpulver oder -granulat (23a) aufgenommene Wärme, um es zum Einspritzen in einen plastischen Zustand zu bringen, auch den Beginn des Aushärtens des Kunststoffbeschichtungsmaterials (23) während des Formvorgangs veranlaßt.

5. Verfahren nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß der durch das erwärmte Kunststofflackpulver oder -granulat (23a) gebildete Überzug (23) nach dem Herausnehmen des Formlings (11) aus der Form (10) aushärtet.

6. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Substrat aus einem Thermoplast hergestellt wird.

7. Verfahren nach Anspruch 6, sofern dieser von einem der Ansprüche 2 bis 5 abhängig ist, dadurch gekennzeichnet, daß man zum Aushärten des Kunststoffbeschichtungsmaterials (23) der Oberfläche des Formlings (11) Wärme zuführt, ohne daß die zugeführte Wärme (14a) eine wesentliche Erweichungswirkung auf das Substrat hat.

8. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß man ein solches Kunstofflackpulver oder -granulat (23a) bereitstellt, das eine Affinität zu dem Substratmaterial hat.

9. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß man vor dem Aushärten oder während des Aushärtens der Materialien ein Vernetzen zwischen dem geformten Kunststoffbeschichtungsmaterial (23) und dem Substratmaterial (24) bewirkt.

10. Verfahren nach einem der vorhergehenden Ansprü-

che, dadurch gekennzeichnet, daß man in dem Kunststofflackpulver oder -granulat (23a) plättchenförmige Additive (40) bereitstellt und eine Verteilwirkung des daraus gebildeten Kunststoffbeschichtungsmaterials in der Form (10) zu einer derartigen Ausrichtung der Plättchen (40) verwendet, daß sie allgemein parallel zur Fließ- oder Verteilrichtung (F) liegen.

11. Durch Doppelspritzgießen hergestellter Formling, der ein Kunststoffsubstratmaterial (24) mit einem Kunststoffbeschichtungsmaterial (23) darauf umfaßt, dadurch gekennzeichnet, daß das Kunststoffbeschichtungsmaterial (23) einen durch Vernetzen von Kunststofflackpulver oder -granulat gebildeten geformten und ausgehärteten Überzug umfaßt.

12. Formling nach Anspruch 11, dadurch gekennzeichnet, daß das es sich bei dem Kunststofflackpulver oder -granulat (23a) um ein wärmehärtbares Material mit einer thermoplastischen Phase handelt.

13. Formling nach Anspruch 11 oder 12, dadurch gekennzeichnet, daß es sich um ein solches Kunststofflackpulver oder -granulat (23a) handelt, das eine Affinität zu dem Substratmaterial hat.

14. Formling nach Anspruch 11, 12 oder 13, dadurch gekennzeichnet, daß es sich bei dem Substratmaterial (24) um ein thermoplastisches Material handelt.

15. Formling nach einem der Ansprüche 11 bis 14, dadurch gekennzeichnet, daß das aus dem Kunststofflackpulver oder -granulat (23a) hergestellte geformte Kunststoffbeschichtungsmaterial (23) mit dem Substratmaterial (24) vernetzt wird.

16. Formling nach einem der Ansprüche 11 bis 15, dadurch gekennzeichnet, daß aus dem Kunststofflackpulver oder -granulat (23a) hergestellte geformte Kunststoffbeschichtungsmaterial (23a) plättchenförmige Additive (40) enthält.

17. Formling nach Anspruch 16, dadurch gekennzeichnet, daß die plättchenförmigen Additive (40) nach dem Formen allgemein in einer zur Ebene des Kunststoff-beschichtungsmaterials (23) parallelen Ebene liegen.

18. Formling nach einem der Ansprüche 11 bis 17 in Form eines Fahrzeugkarosserieteils.

Revendications

1. Procédé de formation d'une pièce moulée peinte, comprenant l'injection d'une matière plastique de revêtement (23) dans un moule (10) et l'injection d'une matière plastique de substrat (24) dans le moule par double injection, pour amener la matière de revêtement à revêtir une surface du moule et pour produire une pièce moulée (11) possédant un revêtement formé par la matière plastique de revêtement (23), caractérisé par le fait que la matière de revêtement (23) est fournie sous forme de matière plastique de peinture réticulante (23a) en poudre ou granulée, et par le chauffage de la matière plastique de peinture en poudre ou granulée jusqu'à un état plastique en vue d'une injection dans le moule.

2. Procédé selon la revendication 1, caractérisé par le fait que la matière plastique de peinture (23a) en poudre ou granulée est fournie sous forme de matière thermodurcissable présentant une phase thermoplastique et par le chauffage de la matière plastique thermodurcissable de peinture en poudre ou granulée pour l'amener à un état plastique en vue d'une injection dans le moule.

3. Procédé selon la revendication 2, caractérisé par le chauffage de la matière plastique de peinture (23a) en poudre jusqu'à environ 80° à 260°C pour l'amener à un état plastique en vue d'une injection dans le moule (10).

4. Procédé selon la revendication 2 ou 3, caractérisé par le fait que la chaleur absorbée par la matière plastique de peinture (23a) en poudre ou granulée permet d'amener celle-ci à un état plastique en vue d'une injection, et de provoquer également l'amorçage du thermodurcissement de la matière plastique de revêtement (23) au cours du processus de moulage.

5. Procédé selon la revendication 2 ou 3, caractérisé par la cuisson du revêtement (23) formé par la matière plastique de peinture (23a) en poudre ou granulée chauffée, après retrait de la pièce moulée (11) du moule (10).

6. Procédé selon l'une quelconque des revendications précédentes, caractérisé par la formation du substrat à partir d'une matière thermoplastique.

7. Procédé selon la revendication 6, lorsqu'elle dépend de l'une quelconque des revendications 2 à 5, caractérisé par l'application de chaleur à la surface de la pièce moulée (11) de manière à cuire la matière plastique de revêtement (23) sans que la chaleur appliquée (14a) ait un quelconque effet de ramollissement substantiel sur le substrat.

8. Procédé selon l'une quelconque des revendications précédentes, caractérisé par le fait qu'une dite matière plastique de peinture (23a) en poudre ou

granulée est fournie sous forme d'une matière présentant une certaine affinité vis-à-vis de la matière de substrat.

9. Procédé selon l'une quelconque des revendications précédentes, caractérisé par la réalisation d'une réticulation entre la matière plastique de revêtement (23) moulée et la matière de substrat (24), avant ou au cours de la cuisson des matières.

10. Procédé selon l'une quelconque des revendications précédentes, caractérisé par le fait que des additifs (40) en forme de flocons sont fournis dans la matière plastique de peinture (23a) en poudre ou granulée, et par l'utilisation de l'action d'étalement de la matière plastique de revêtement formée à partir de celle-ci dans le moule (10) afin d'orienter des flocons (40), de telle sorte qu'ils se placent généralement parallèlement à la direction de l'écoulement ou de l'étalement (F).

11. Pièce moulée formée par double injection, comprenant une matière plastique de substrat (24) sur laquelle se trouve une matière plastique de revêtement (23), caractérisée en ce que la matière plastique de revêtement (23) comprend un revêtement moulé et cuit, formé à partir d'une matière plastique de peinture réticulante (23a) en poudre ou granulée.

12. Pièce moulée selon la revendication 11, caractérisée en ce que la matière plastique de peinture (23a) en poudre ou granulée est une matière thermodurcissable présentant une phase thermoplastique.

13. Pièce moulée selon la revendication 11 ou 12, caractérisée en ce que la matière plastique de peinture (23a) en poudre ou granulée est une matière présentant une certaine affinité vis-à-vis de la matière de substrat.

14. Pièce moulée selon la revendication 11, 12 ou 13, caractérisée en ce que la matière de substrat (24) est une matière thermoplastique.

15. Pièce moulée selon l'une quelconque des revendications 11 à 14, caractérisée en ce que la matière plastique de revêtement (23) moulée, formée à partir de la matière plastique de peinture (23a) en poudre ou granulée, est réticulée avec la matière de substrat (24).

16. Pièce moulée selon l'une quelconque des revendications 11 à 15, caractérisée en ce que la matière plastique de revêtement (23a) moulée, formée à partir de la matière plastique de peinture (23a) en poudre ou granulée, comporte des additifs (40) en forme de flocons.

17. Pièce moulée selon la revendication 16, caractérisée en ce que les additifs (40) en forme de flocons se trouvent généralement dans un plan parallèle au plan de la matière plastique de revêtement (23) après le moulage.

18. Pièce moulée selon l'une quelconque des revendications 11 à 17 sous la forme d'une pièce de la carrosserie d'un véhicule.

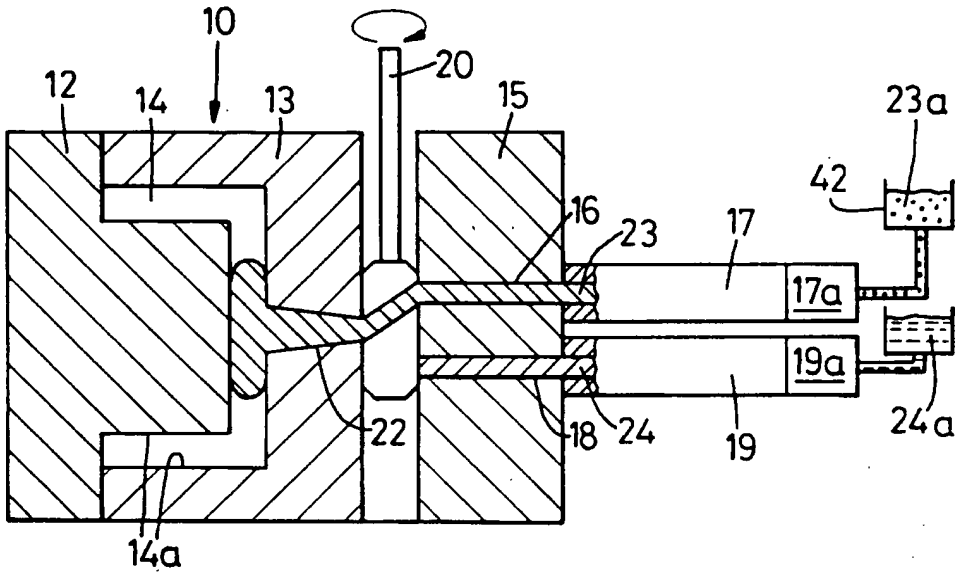
10
12
14
13
20
15
23a
42
16
23
17
17a
19a
22
18
24
19
24a
14a

Fig. 1

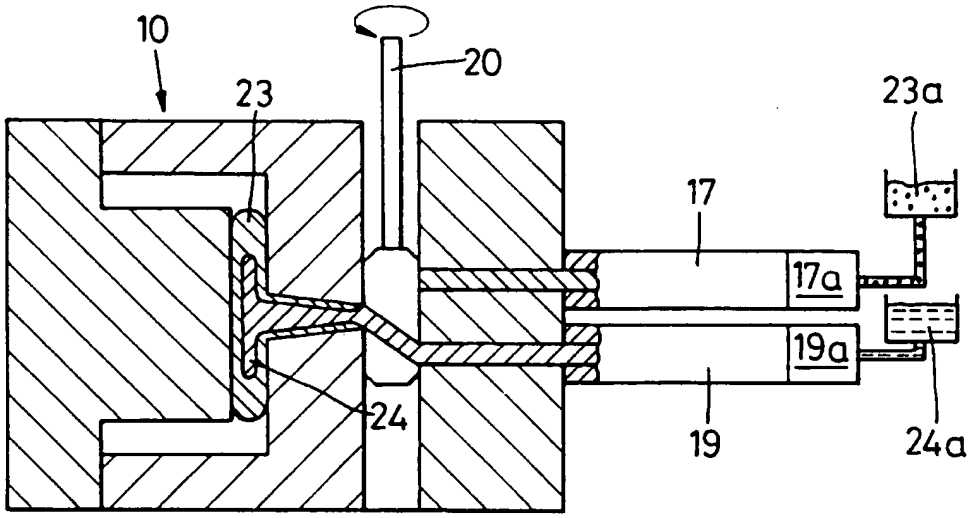
10
23
20
23a
17
17a
19a
24
19
24a

Fig. 2

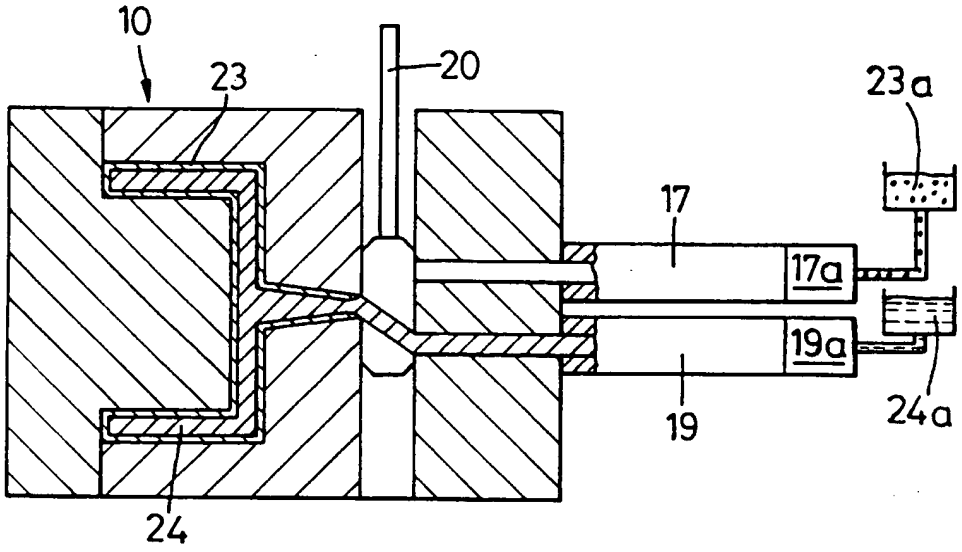

Fig. 3

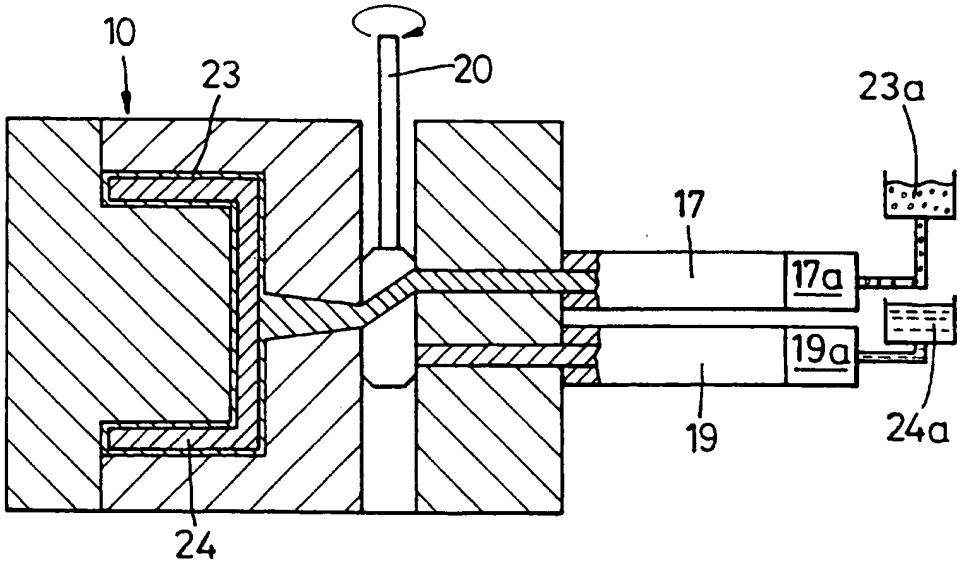

Fig. 4

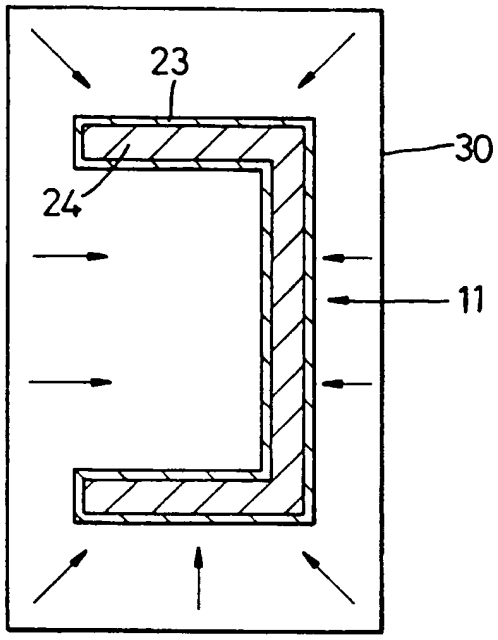

Fig. 5

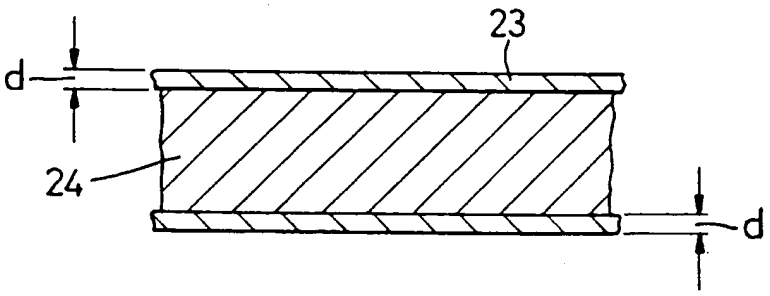

Fig. 6

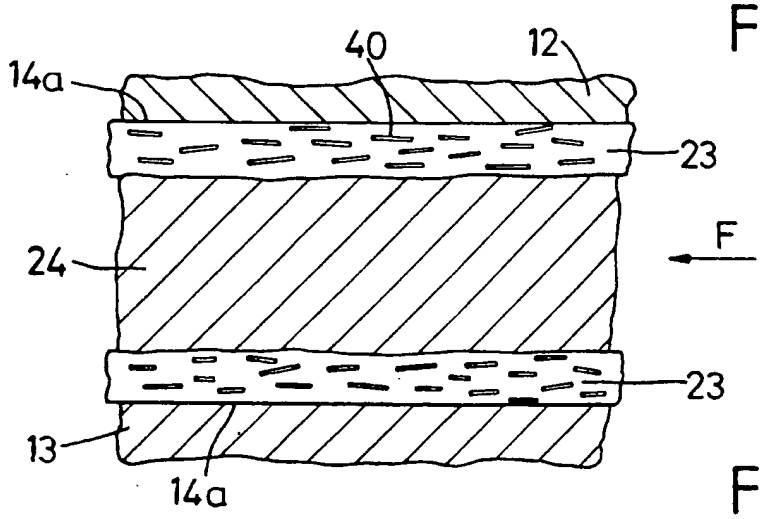

Fig. 7

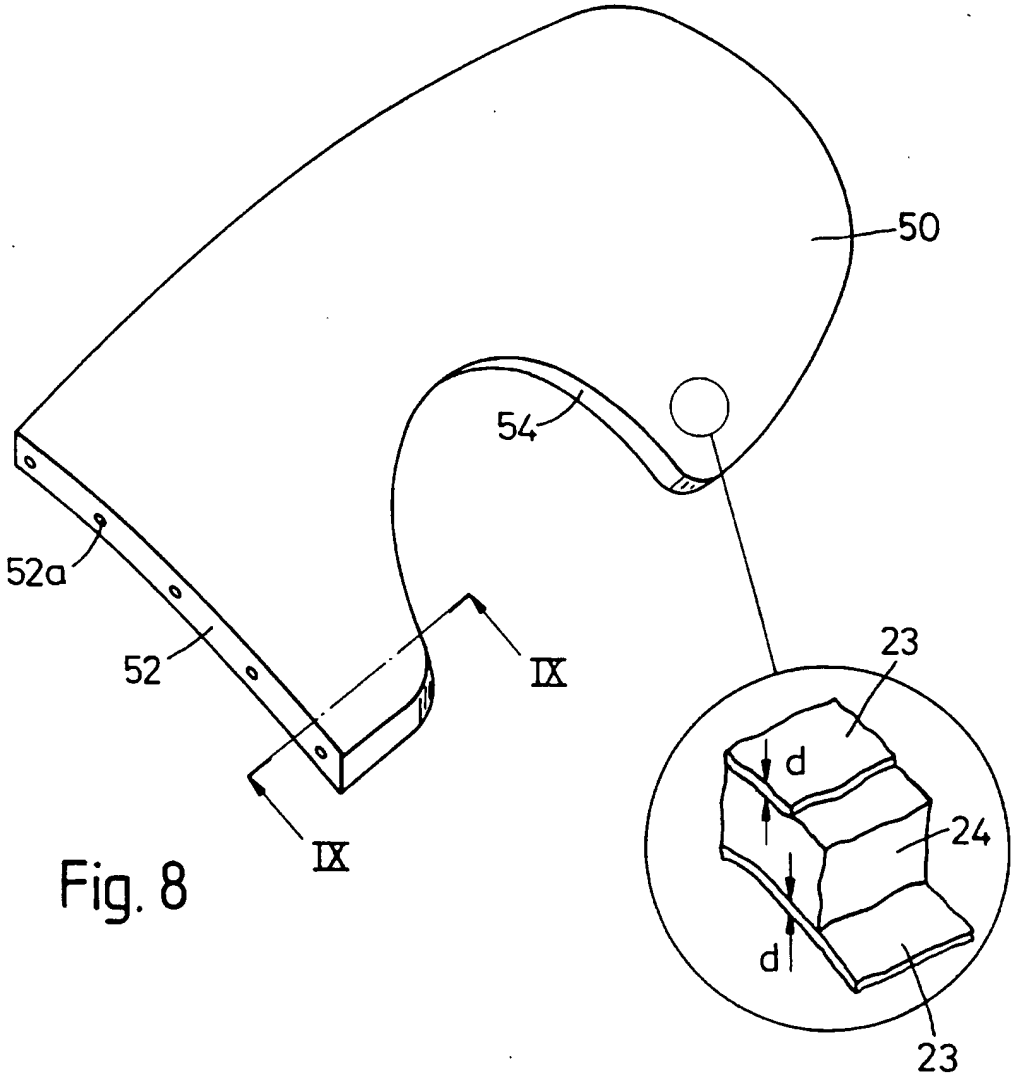

Fig. 8

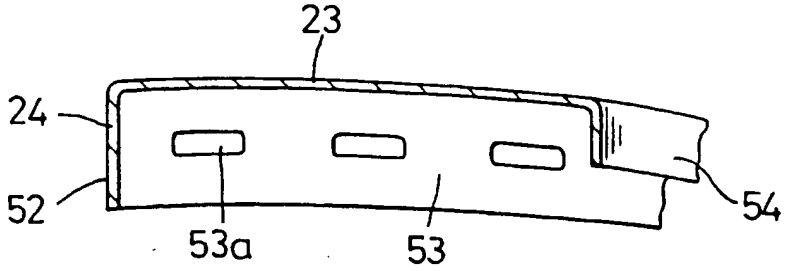

Fig. 9